tree, (*Terminalia Catappa* L.), *Cocos nucifera* L. and *Anona muricata* L. were the arborescent species collected by the writer on this island. *Ipomoea Pes-caprae* Sw. is the character plant of the low beaches, while *Lantana trifolia* L., *Solanum torvum* Sw., *Solanum Jamaicense* Mill., *Bidens leucantha* Willd., and *Wedelia carnosa* Pers. are species that have withstood destruction from cattle. The marshy places of the island support *Mariscus rufus* H.B.K. and a sedge, *Fimbristylis spadicea* Vahl.

Located at the extremity of the peninsula of land between the east and the west harbors is an old abandoned fort. The rocks immediately in front of the grass-grown sward about the fort are honeycombed by the waves. On these rocks projecting over the sea and in storms wet by the spray that is tossed up from beneath, a few plants seem to thrive, viz., *Wedelia carnosa* Pers., *Coccoloba uvifera* L., *Ruellia tuberosa* L., *Crotalaria incana* L. and *Plumeria* sp. Hanging over the rocks and lying prostrate on the ground, *Borrichia arborescens* (L.) DC. completes the list of observed strand plants.

Little has been done on a comparative study of the floras of the several Bahama islands and that of the Greater Antilles. Our knowledge as yet is very fragmentary and this article is presented as in part a contribution to a comparative study of the flora of the West Indies.

University of Pennsylvania.

OBSERVATIONS ON ETIOLATION

By Carlton C. Curtis

The position recently taken by Dr. MacDougal * as to the action of light upon growth must find ample support from the results obtained in every laboratory. I doubt not that it is a common experience that better illustrations of etiolation are obtained under feeble illumination than in darkness. It has always been a source of surprise to me to note the amount of light that

* Influence of Light and Darkness on Growth and Development. Mem. N. Y. Bot. Garden, 2:—. 1903.

many plants can endure and still show the familiar characters of so-called etiolated forms. Plants grown in dark chambers to which a meager amount of feeble diffuse light is admitted show, in my experience, more marked "etiolated" characters than when grown in the dark room. While there is a wide difference in the response of plants to varying intensities of light, in a general way it may be stated that nearly all will endure a surprising amount of illumination without receiving a sufficient stimulation to enable them to accomplish the morphological differentiation that is associated with light. . The potato vine furnishes one of the best examples that I recall of the amount of light that a plant can endure without loss of etiolated characters. This difference in behavior of plants in feeble light and in darkness amounts to a demonstration of the non-paratonic action of light upon many plants at least. When growth occurs in absolute darkness the environment is so unfavorable that pathological conditions soon arise, or the vital processes are carried on under such abnormal conditions that it often appears impossible to interpret the reactions or explain them as due to any particular cause. The considerable variation that is often to be seen in a series of any species of plant is doubtless an illustration of this fact. The entire vital mechanism of the plant is out of order through lack of the normal controlling and directive impulses. Under such circumstances a factor of little moment or unmeasurable in its influence may now become a controlling force in producing a certain development. I have often had occasion to note the marked influence that a slight increase in the humidity has upon growth. Shoots of potatoes produced a more rapid and pronounced elongation when covered than was the case with stems growing beside them, though both were at first in an atmosphere containing 50 per cent. of moisture. Without doubt this reaction is largely attributable to the amount of moisture furnished to the reserve food in the tuber. In the same way tubers and bulbs usually develop more vigorous growths when planted than when laid upon moist sand or sphagnum. This is true even when they are covered with cans that ensure a high percentage of moisture to the plant. It is possible that the manner of presentation as well

as the amount of moisture may be a factor in the results obtained. These instances are mentioned as illustrations of the fact that in etiolation phenomena we are dealing with a growth in which the propelling forces are so weak and so simplified, comparatively speaking, that as a result the slightest cause may lead to marked deviations. This may explain the variations that were noticed in a series of etiolated seedlings of *Quercus velutina*. In one experiment a few of the plants showed a second growth, that might be interpreted as adaptive, although the majority perished before or after the usual number of scales and leaves were developed. In another case several plants showed a continued growth without any interruption, and finally developed the same number of leaves as were found upon the plants that exhibited the renewal of growth. They developed, however, a greater length of stem, and the leaves were not clustered as in the first case, but were separated by fairly regular intervals. In the second experiment, the plants were germinated in feeble light, but were removed to the dark room as soon as the first shoots appeared above the soil and before there was any appearance of chlorophyll. It is very possible that the presence of enzymes and the availability of foods made possible by the conditions of germination may account for the difference of growth.

In the same way other reactions of plants in darkness may possibly be explained. For example, I have noticed the twining habit of several plants, as recorded by Noll. The sweet potato grows remarkably well in the dark and the etiolated stems begin to twine when they have attained a length of a meter or more. This phenomenon is also strongly marked in young shoots of *Falcata comosa* — a plant that is especially suitable to experimentation since it reaches a normal development in the laboratory where the light is often not of the best and shows striking contrasts with the etiolated plants. However, it should be remarked that these plants were exposed to an occasional illumination of the electric light for purposes of examination and watering. Several plants of *Falcata* that were grown this spring under a can in the dark room and not exposed to light were found, when finally examined, to have developed shoots that

were not only decidedly more attenuated than those of the control plants and without any indication of curvature, but the stems had not the thickness of those uncovered plants that were grown beside them. While this experiment is not offered as an example of the loss of irritability, since the facts are too meager to warrant such a conclusion, it does show in connection with others that need not be mentioned, that occasional artificial illumination may have a pronounced influence upon the growth of etiolated plants. So it would appear that we must materially alter our conceptions, in many cases, at least, of the term etiolation if we mean by it the development that is possible in total darkness.

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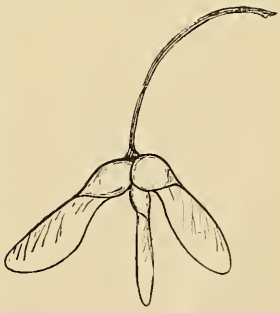
SHORTER NOTES

A triple Samara in Acer rubrum. — The double samara of the maples is an almost constant feature, although in *Acer saccharinum* L. only one samara usually matures, which is doubtless an aid to their better flight.

The occurrence of a perfect mature triple samara in *Acer rubrum* L. seems worth recording. (The figure shown herewith is three quarters natural size.) A three-celled, three-lobed ovary is reversionary, and harks back to the days when the ancestral maples had a three or more celled ovary, and probably two ovules in each cell as they sometimes do now, conditions which usually obtain in the order Sapindales. There seems to have been a progressive reduction in these parts throughout the order, which is still going on, the bulk of the Sapindales being inconstant in these features. This reduction effects a great saving in vital energies and material. It may not be amiss to take a glance at what we know about *Acer* history.



Acer is essentially a Tertiary and modern genus, although a number of unmistakable samaras have been found in the Raritan